



U.S. Department of Energy
Energy Efficiency and Renewable Energy



Leading Our Nation Towards Energy Independence

*Steve Chalk, Program Manager
Hydrogen, Fuel Cells and
Infrastructure Technologies*

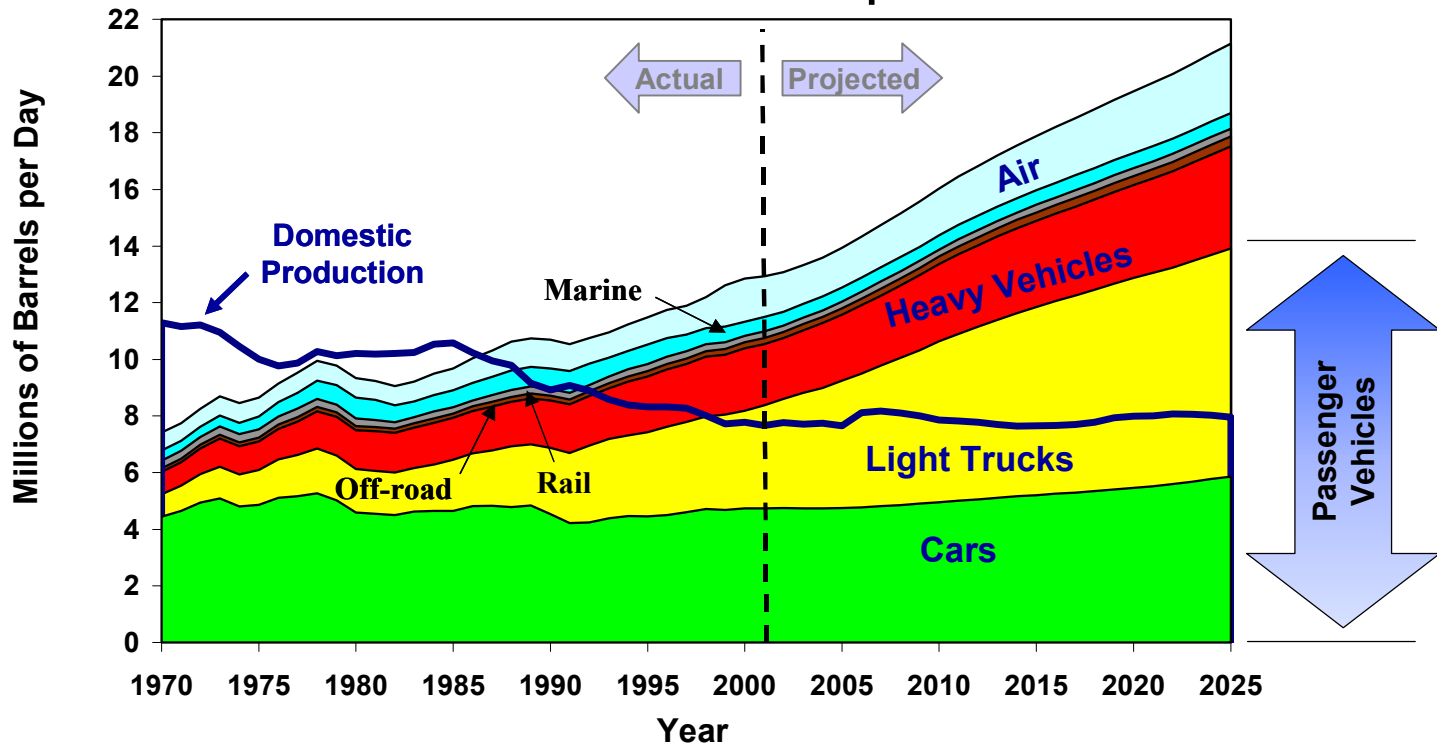
Presentation to
National Hydrogen Association's
14th Annual U.S. Hydrogen Meeting
March 5, 2003
Washington, DC



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U.S. Energy Dependence is Driven By Transportation

US Oil Use for Transportation



Source: Transportation Energy Data Book: Edition 22, September 2002,
and EIA Annual Energy Outlook 2003, January 2003

- Transportation accounts for 2/3 of the 20 million barrels of oil our nation uses each day.
- The U.S. imports 55% of its oil, expected to grow to 68% by 2025 under the status quo.
- Nearly all of our cars and trucks currently run on either gasoline or diesel fuel.



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President Bush Launches the Hydrogen Fuel Initiative

"Tonight I am proposing \$1.2 billion in research funding so that America can lead the world in developing clean, hydrogen-powered automobiles.

"A simple chemical reaction between hydrogen and oxygen generates energy, which can be used to power a car producing only water, not exhaust fumes.

"With a new national commitment, our scientists and engineers will overcome obstacles to taking these cars from laboratory to showroom so that the first car driven by a child born today could be powered by hydrogen, and pollution-free.

"Join me in this important innovation to make our air significantly cleaner, and our country much less dependent on foreign sources of energy."

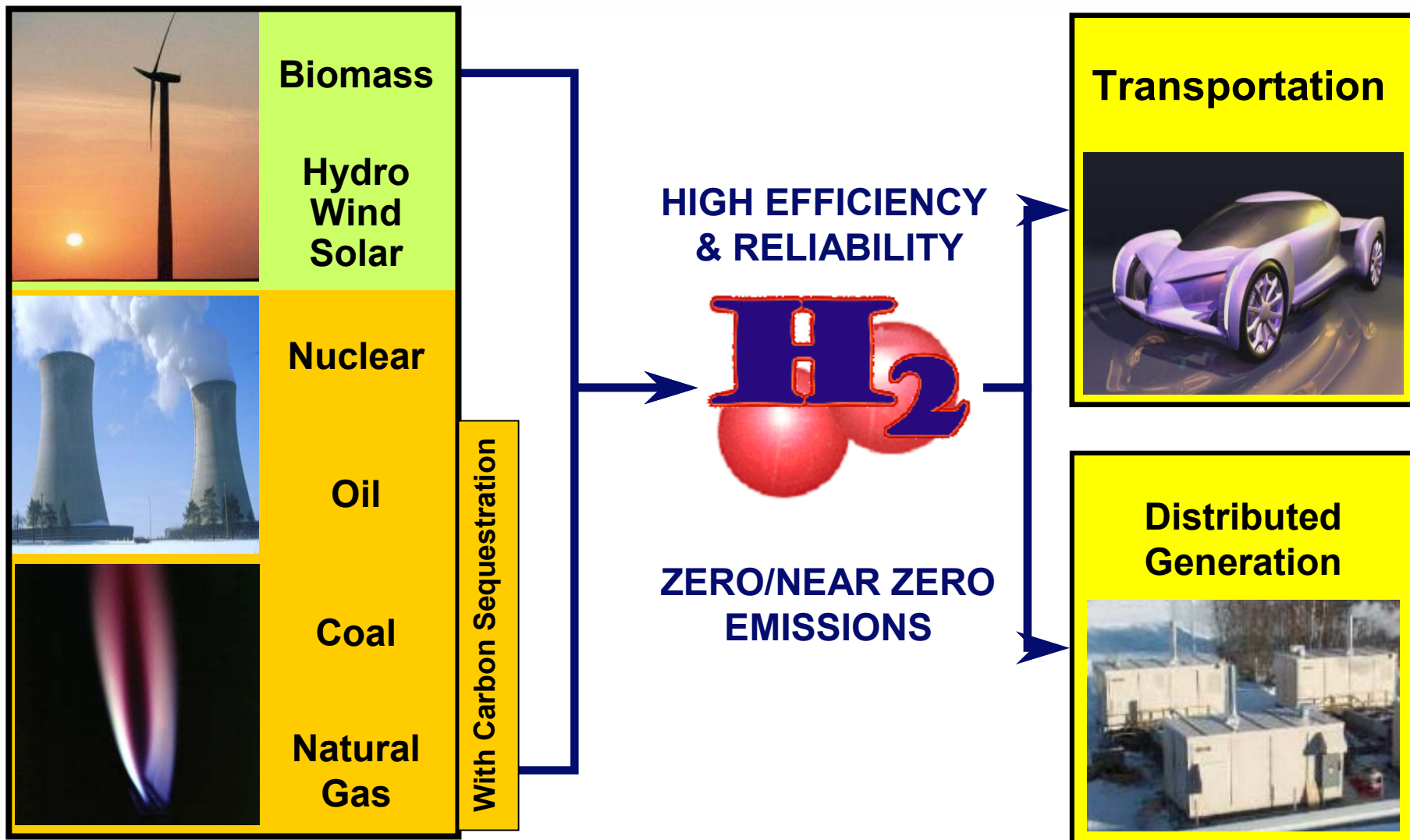


2003 State of the Union Address
January 28, 2003



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Why Hydrogen? It's abundant, clean, efficient, and can be derived from diverse domestic resources.





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President's Hydrogen Fuel Initiative Complements FreedomCAR

- Freedom from foreign petroleum dependence
- Freedom from pollutant and carbon dioxide emissions
- Freedom for Americans to drive where they want, when they want, in the vehicle of their choice
- Freedom to obtain fuel affordably and conveniently



On January 9, 2002, Energy Secretary Abraham announced the FreedomCAR Partnership



**FreedomCAR and Fuel
Initiative**





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President's FreedomCAR and Fuel Initiatives

DOE partners with USCAR and energy companies to develop hydrogen and fuel cell technologies simultaneously:

- ❖ FreedomCAR focuses on fuel cell vehicle and hybrid component technologies
- ❖ Hydrogen Fuel Initiative focuses on hydrogen storage and production and delivery infrastructure technologies

Government leadership will help advance commercialization of hydrogen fuel cell vehicles and infrastructure by 15 years, from approximately 2030 to 2015.



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Hydrogen Infrastructure and Fuel Cell Technologies put on an Accelerated Schedule

- President Bush commits \$1.7 billion over first 5 years:
 - ❖ \$1.2 billion for hydrogen and fuel cells RD&D (\$720 million in new money)
 - ❖ \$0.5 billion for hybrid and vehicle technologies RD&D
- Accelerated, parallel track enables industry commercialization decision by 2015.



*Fuel Cell Vehicles in the Showroom
and Hydrogen at Fueling Stations
by 2020*



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The President's FY04 Budget Request for FreedomCAR and Hydrogen Fuel Initiatives

Organization	Million \$
Hydrogen, Fuel Cells & Infrastructure Technologies Program (EERE)	165.5
FreedomCAR and Vehicle Technologies Program (EERE)	91.1
Office of Fossil Energy (FE)	11.5
Office of Nuclear Energy, Science and Technology (NE)	4.0
Department of Transportation (RSPA)	0.7
<i>Total</i>	<i>272.8</i>



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Fiscal Year 2004 Hydrogen Production Funding (\$38.5M)

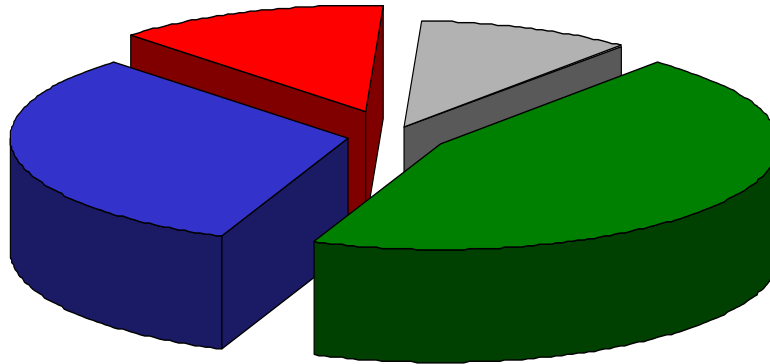
The Department of Energy's Offices of Fossil Energy, Nuclear Energy, and Energy Efficiency and Renewable Energy are collaborating on cost-shared hydrogen production R&D:

Coal - \$5 million (FE)

- Separation of pure hydrogen gas from synthesis gas (CO and hydrogen)
- Technologies also applicable to biomass feedstocks

Nuclear - \$4 million (NE)

- High temperature chemical cycles for splitting water



Natural Gas – \$12.2 million (FE/EERE)

- Small, distributed systems to begin making hydrogen available at local refueling stations
- Centralized Production

Renewables - \$17.3 million (EERE)

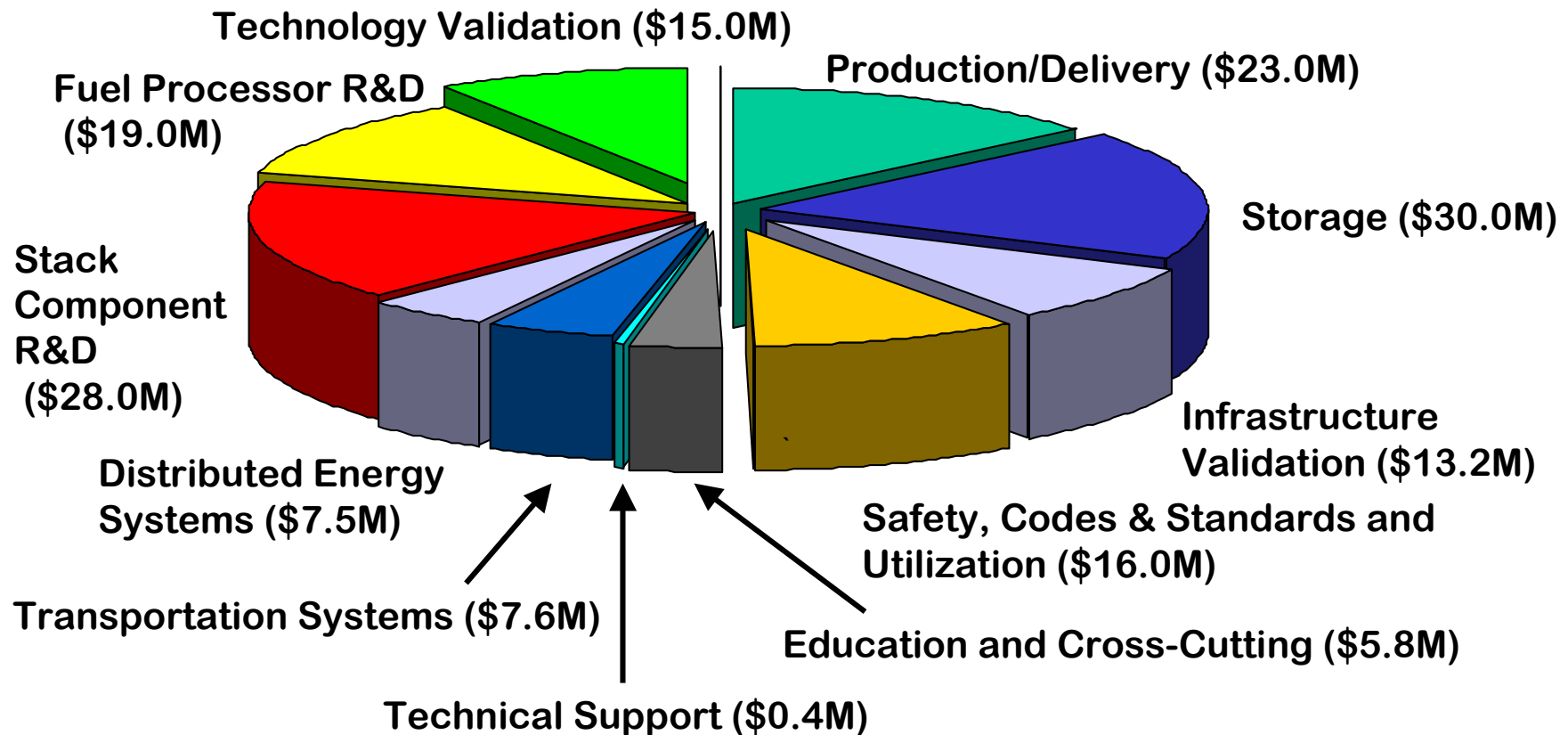
- Direct water splitting using solar energy
- Thermal processes using biomass
- Advanced electrolysis from wind power
- Biological WGS Processes

Energy Independence through Diversity of Domestic Supplies



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FY04 EERE Hydrogen and Fuel Cell Budget Request (Key Activities)



Total FY 04 Request \$165.5M



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Hydrogen, Fuel Cells and Infrastructure Technologies Program

Program Focus: Research, develop, and validate fuel cell and hydrogen production, delivery and storage technologies for transportation and stationary applications

Major Activities	FY02 Approp.	FY03 Approp.	FY04 Request
Hydrogen Production & Delivery	\$11.2M	\$11.8M	\$23.0M
Hydrogen Storage	\$6.1M	\$11.3M	\$30.0M
Safety, Codes & Standards, Education	\$5.9M	\$6.8M	\$21.8M
H2 Infrastructure/FC Vehicle Demo	\$5.7M	\$11.9M	\$28.2M
Fuel Cell Systems & Components	\$46.7M	\$53.7M	\$62.5M
TOTAL	\$75.6M	\$95.5M	\$165.5M

Highlights

- Advanced production technologies (reforming, separation, photoelectro-chemical, photobiological, electrolysis)
- Solid-state hydrogen storage materials (carbon, hydrides, etc.)
- Safety, performance & connectivity standards for hydrogen fueled devices
- Integrated fuel cell vehicle and hydrogen infrastructure technology validation
- Fuel cell stack component cost reduction (catalyst & membrane) and stationary systems development





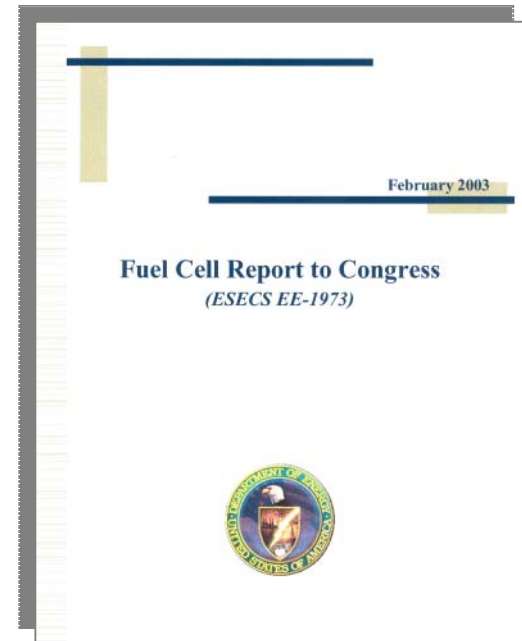
Fuel Cell Report to Congress

Need for Public/Private Partnerships

- Stationary and Distributed Generation to continue robust research activities to
 - lower costs and improve durability, and
 - establish field evaluations.
- Transportation and Infrastructure to establish learning demonstrations of fuel cell vehicles and hydrogen infrastructure.

Program Adjustments

- Core Technology Development *re-focused* on advancements to lower cost and increase durability.
- *Increased* emphasis on hydrogen production and delivery infrastructure, storage, codes and standards development, and education.





Near Term Opportunities for Hydrogen and Fuel Cell R,D,&D

- **Hydrogen Production**
 - EOPI requesting candidate research topics closes March 14, 2003
 - Anticipated Solicitation Release – June 2003
- **Hydrogen Storage**
 - Anticipated Solicitation Release – April 2003
- **Fuel Cells**
 - Stationary/Automotive Applications proposals due March 27, 2003
 - Portable/Auxiliary Power Units - Solicitation Release – March 2003
- **Technology Evaluation & Validation**
 - Pre-solicitation conference – March 19, 2003
 - Anticipated Solicitation Release – April 2003
- **Codes/Standards**
 - Multiple Solicitations Anticipated – late 2003
- **Education**
 - 2003 State Energy Program Special Projects - Proposals from states due May 19, 2003



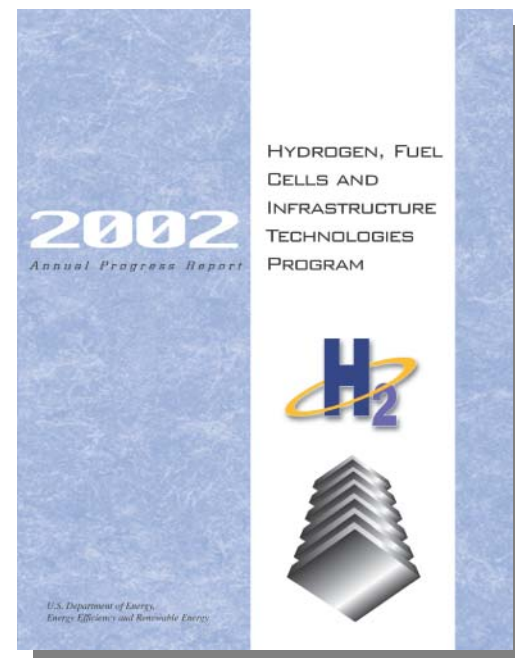
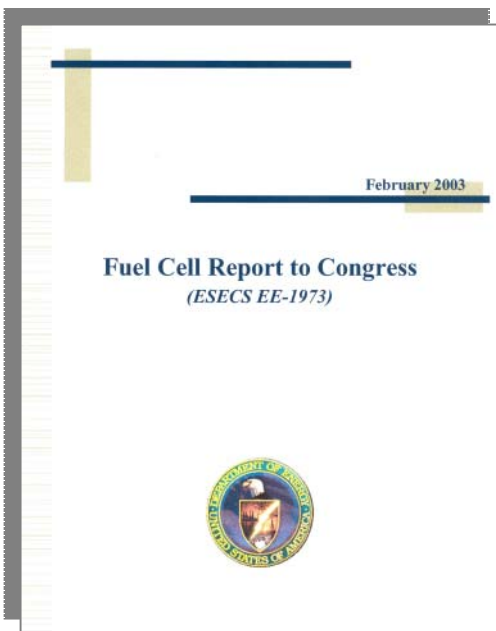
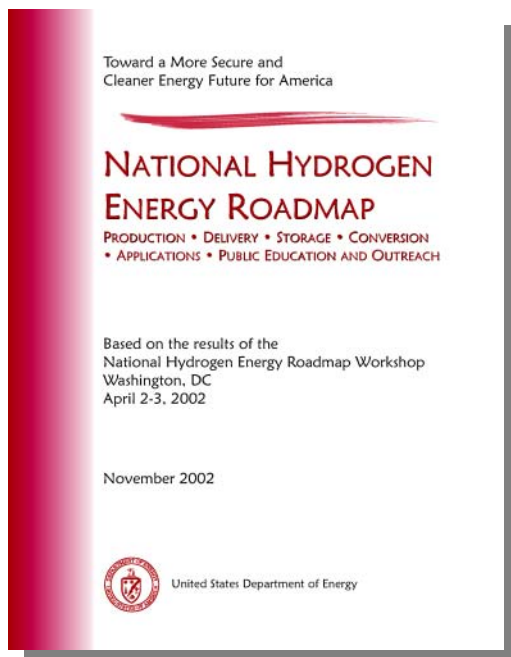
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www.eere.energy.gov/hydrogenandfuelcells